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# TeleCommunication Systems, Inc.

## Interim Text-to-9-1-1 Emergency Solution Statement of Work For

# Fairfax County, Virginia

**10/23/2014** Revised **REDACTED COPY**

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### Document Modification History

| Date | Section | Modified By |
|---|---|---|
| 12/18/2014 | 5.4.1, Page 13 | R. Gojanovich |
| 1/20/2015 | 1, Page 4 – Inserted Contract Number | TCS |
| 2/4/2015 | 5.2.8, Page 11 | G. Sivaram |

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As of June 30, 2014, TCS held 361 issued patents and had more than 300 patent applications pending worldwide. Its patents cover a broad spectrum of technologies, including wireless data, text and voice telecommunications, location based services, GIS/mapping, intercarrier messaging, secure communications, public safety/ E9-1-1, and mobile navigation.

NasdaqGM: TSYS

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Disposal: When electronic media or printed media containing TCS proprietary information are no longer needed and any applicable retention period has lapsed, the data should be electronically deleted or physically destroyed. All Proprietary Level 2 printed media must be shredded or securely disposed of.

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# 1. Introduction

This Statement of Work ("SOW") is made by and between Fairfax County, Virginia ("Fairfax", "Fairfax County" or the "County") and TeleCommunication Systems, Inc. ("TCS") and is governed by and will be performed under the terms and conditions of Contract Number 4400005651 (the "Agreement") to which this SOW is attached and made a part. It describes TCS' Text-to-9-1-1 services, to be provided by TCS to Fairfax under the Agreement. It explains how the Text-to-9-1-1 services, will work from a technical, deployment, and operational perspective. The document sets forth the parties' respective roles and responsibilities with regard thereto. The parties acknowledge and agree that Fairfax shall use the Text-to-9-1-1 services for a period and with a start date as mutually agreed upon and expressly identified in the mutually agreed upon purchase order issued by the County under the Agreement authorizing TCS to proceed with the work described in this SOW.

# 2.0 PSAP Text-to-9-1-1 Solutions

The technical solution from TCS consists of integrating TCS' existing Text Control Center (TCC) with the TCS EMedia system. The solution complies with Alliance for Telecommunications Industry Solutions (ATIS)/Telecommunications Industry Association (TIA) JSTD-110 national SMS Text-to-9-1-1 standard.

The TCS TCC manages the text messages as they originate from TCS-connected carriers. This system consists of Short Message Peer-to-Peer Protocol (SMPP) interfaces that connect to carrier Short Message Service Centers (SMSCs), and Mobile Location Protocol (MLP) interfaces that connect to carrier location servers. The TCC also utilizes a National Emergency Number Association (NENA) i3-compliant Emergency Services Routing Proxy (ESRP) to query the Emergency Call Routing Function (ECRF). The ECRF relies on Geographic Information System (GIS) data gathered by TCS. The TCC also uses an ATIS-compliant MSRP interface, called MxP, to interface with other TCCs. The TCS TCC service includes the following functions:

- Accepts incoming sessions.
- Verifies that there is a text-capable PSAP available in that area (based on GIS and rules).
- If there is no available PSAP, the TCC sends a bounceback message to the texter.
- If the message originates within the boundary of an Emergency Services IP Network (ESInet) supporting MSRP, the TCC sends the message to that ESInet.
- If the message originates within the boundary of a PSAP connected to a different TCC, it will forward the session to that TCC for delivery.
- If the PSAP is subscribed, it sends the session to EMedia.

## 1.1 [redacted]

[redacted]

[redacted]

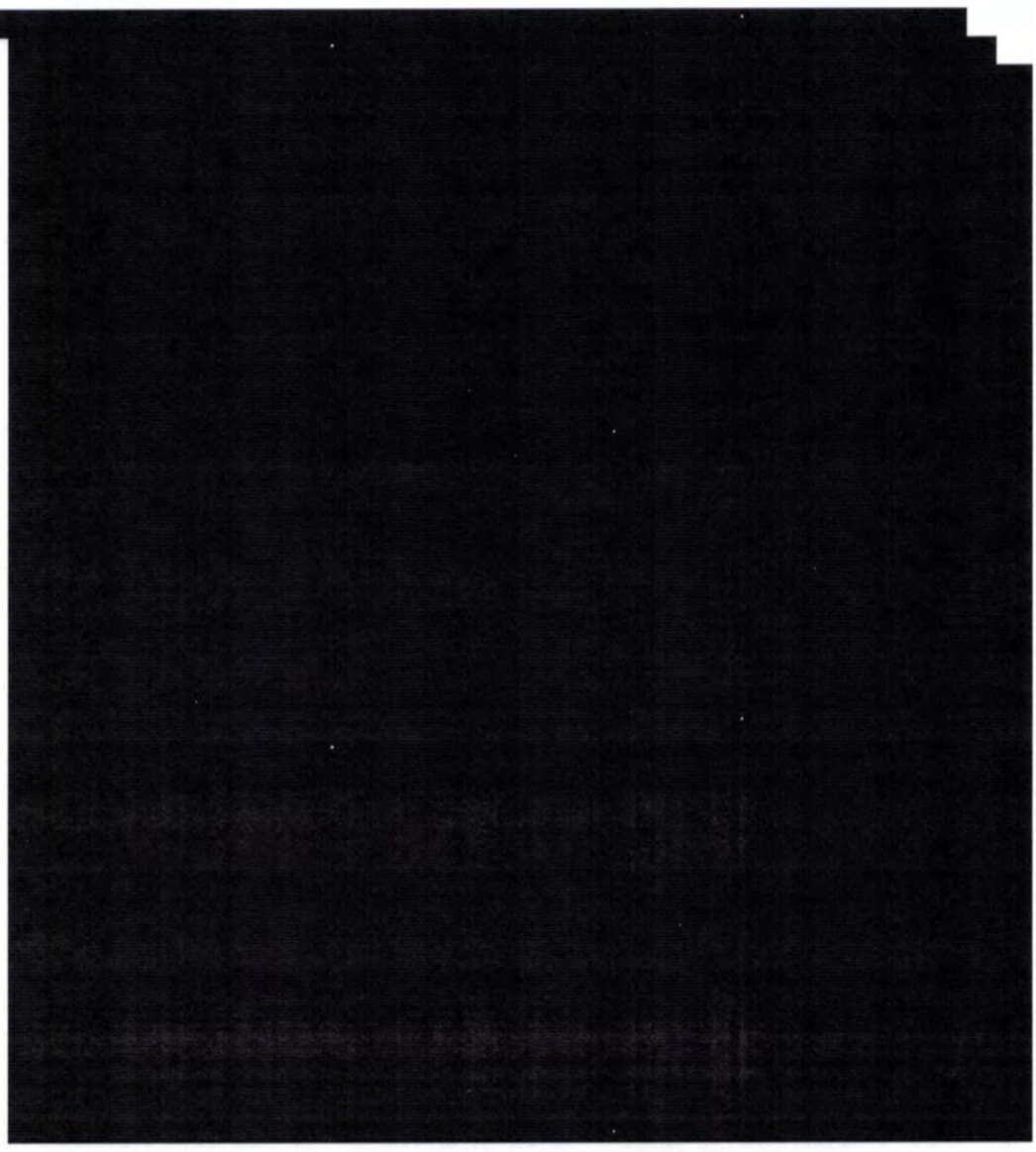

***Exhibit 1.*** [redacted]

## 1.2 EMedia Web Browser Interface is GEM9-1-1™

The EMedia browser interface is GEM9-1-1™ (Geospatial Emergency Messaging). The GEM9-1-1 browser-based interface includes an administrative portal for the creation of predefined messages for operators to choose as responses to texters. These predefined responses are accessed via a drop-down box. The interface supports both the creation and list priority for these messages. The administrative portal also provides PSAP administrators the ability to set up operator accounts and reset passwords. The administrator(s) also can select from a number of policy routing rules, including

time-of-day maximum number of concurrent sessions allowed and failover routing to alternate PSAPs.

The GEM9-1-1 browser interface will be delivered to Fairfax County and other MWCOG PSAPs from TCS data centers in Dallas, Texas, and Raleigh, North Carolina, over Multiprotocol Label Switching (MPLS) circuits to the MWCOG chosen points of presence. Fairfax County and MWCOG can choose between Hypertext Transfer Protocol (HTTP) or Hypertext Transfer Protocol Secure (HTTPS) as the protocol for web delivery.

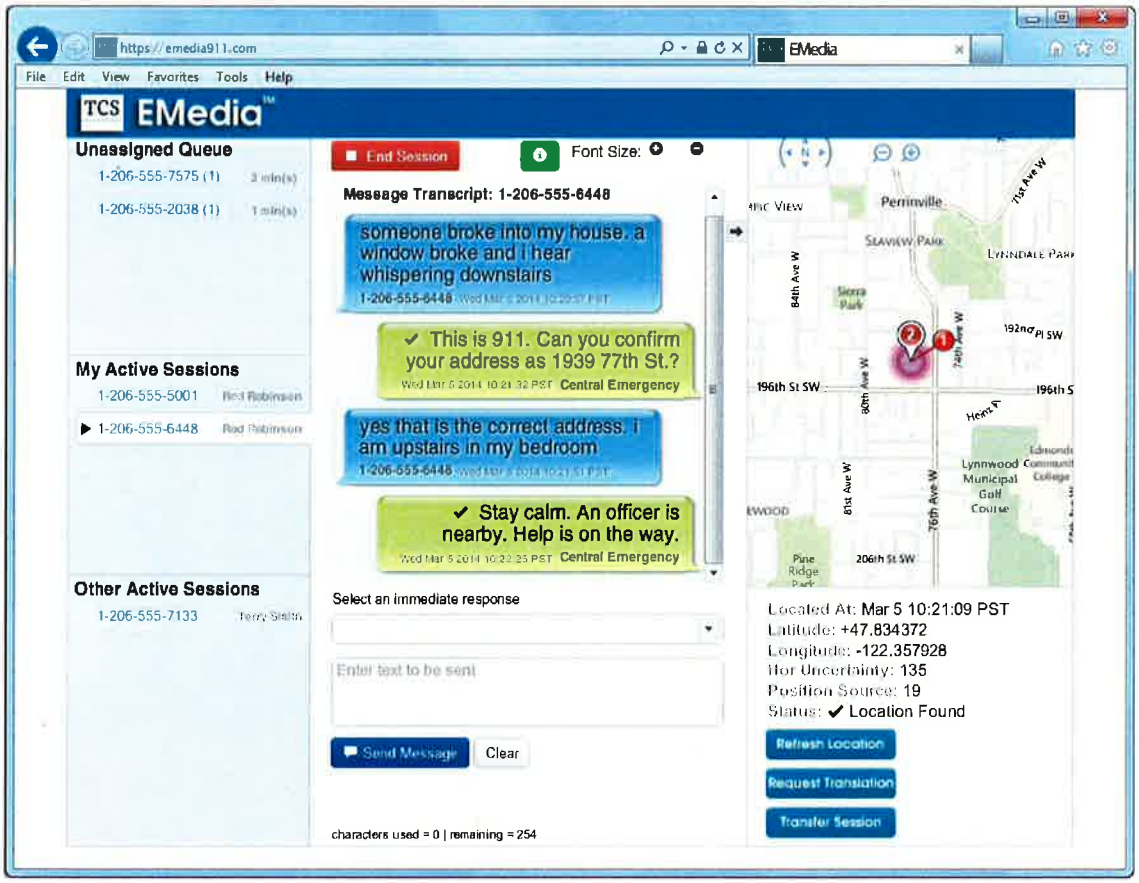


***Exhibit 2. EMedia GEM9-1-1 Web Browser Interface***

## 1.3 Compliance Matrix and Work Description

The table below lists the original RFP requirement number from Fairfax's RFP2000001214 and the corresponding work description that TCS shall perform.

If the feature requires development and is included in the pricing in the proposal, the work description shall note, "This feature is targeted for deployment in [month] 2015."

If the requirement or a portion of the requirement is not offered by TCS, as originally noted in the RFP, the work description notes, "Requirement is deprecated". These requirements include: 5.1.4, 5.1.6 (SIP/MSRP i3 CPE interface), 5.2.1 (CAD interface and CAD civic address), 5.2.2 (CAD interface and CAD civic address), 5.2.3 (CAD interface and CAD civic address), 5.2.9, 5.4.1, 5.7.1, 5.8.2, 5.10.2.1, 5.10.3.1, and 5.11.4 (non-CSV report formats). If separately requested by Fairfax in

writing, the deprecated requirements noted can be developed through the professional services offering billable at the quoted hourly rate through separate work orders to be mutually agreed upon by the parties.

| RFP Requirement No. | Work Description |
|---|---|
| | **General Operational Requirements** |
| **5.1** | **Emergency Call Routing Function (ECRF) for Text Messages** |
| 5.1.1 | The solution shall comply with the joint Alliance for Telecommunications Industry Solutions (ATIS)/Telecommunication Industry Association (TIA) Native SMS to 9-1-1 Requirements & Architecture Specification A J-STD-110 Standard. The solution shall be connected to the other available Text Control Centers (TCCs) and aggregate incoming Short Message Service (SMS) text messages from the public provided by wireless carriers/vendors and distribute the text message to the appropriate MWCOG Public Safety Answering Point (PSAP) in the format required by that PSAP (web browser, TTY, Direct IP interface). The solution shall comply with the NENA i3 GIS location based routing mechanism and shall provide three standard distribution options: over a browser (GEM9-1-1) interface, TTY via the interconnected selective router(s), and DirectIP or SIP/MSRP to MSRP- capable CPE. |
| 5.1.2 | The solution shall function as a single aggregator and support a Regional Deployment where multiple PSAPs in a given jurisdiction could have text messages aggregated through one interface to multiple TCC vendors and multiple carriers providing SMS to 9-1-1 services. The solution shall minimize interconnection points between the solution and the PSAP by providing a single content distribution node from the aggregator solution to the PSAP interface. Such an interface node shall be compatible with all i3 CPE, TTY, and Web-based text displays. |
| 5.1.3 | The solution shall operate both at Fairfax County primary locations (PSTOC) using a web browser and at Fairfax County Alternate Centers (Pine Ridge) or at such additional locations as the County determines at a subsequent point with the vendor. The solution shall not require replacement of Fairfax CPE.<br>Fairfax shall make two points of presence available for MPLS connectivity. Fairfax shall permit TCS to deliver the browser interface delivered to the PSAPs behind a Fairfax firewall. Fairfax shall permit the use of existing CPE browser capability. |
| 5.1.4 | Requirement 5.1.4 is deprecated. |
| 5.1.5 | The solution shall require that a person needing emergency assistance enter the short code "9 1 1" in their wireless device in order to have an emergency text message sent to the Fairfax PSAP, compliant to JSTD-110 standard. The solution shall not require registration of devices to receive SMS Text-to-9-1-1 services in Fairfax. |
| 5.1.6 | The solution shall allow messages to be transferred between adjoining PSAPs (primary and secondary) that use the solution's GEM9-1-1 browser interface. This feature is targeted for deployment in April 2015,<br>The solution shall allow messages to be transferred between adjoining primary PSAPs that use the solution's SIP/MSRP CPE interface. This i3 CPE portion of the requirement is deprecated. This feature is a roadmap item that will be based upon the future publication of ATIS SIP/MSRP standard, |
| 5.1.7 | The solution shall provide TTY transfer of SMS texts between TTY PSAPs on the same selective router that TCS is connected to. The capability is limited to the selective router connectivity provided by the Level 3 Emergency Services Gateways (ESGWs). |

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| 5.1.8 | The solution shall:<br>• Aggregate SMS text-to9-1-1 messages from multiple TCCs and distribute them to the Fairfax County PSAP (and adjoining PSAPs in later stages) as deployed using the various available interfaces: browser (GEM9-1-1), TTY, or Direct IP (SIP/MSRP).<br>• Support any JSTD-110 and NENA 08-003 compliant text-enabled CPE interface that has implemented the ATIS and NENA standard SIP/MSRP interface. TCS will interoperate with CPE vendor equipment for transfers based on the SIP REFER method in NENA i3.<br>• By the end of 2015, support transfer of text sessions between the different interfaces between GEM9-1-1 browser, i3 CPE capable of DirectIP or SIP/MSRP CPE, and other browsers. |
| 5.1.9 | The solution shall function as a terminating TCC that uses an ESRP for routing and shall distribute text-to-9-1-1 messages by providing three interface types:<br>• The TTY interface with selective router connectivity through Level 3 Communications' ESGW,<br>• The GEM9-1-1 web browser interface delivered over MPLS to the National Capital Region Network (NCRnet) for use by the call taker,<br>• The SIP/MSRP interface to interoperate with i3ESInets or MSRP CPE at the PSAP. |
| 5.1.10 | **Facilitating Transition**<br>The solution shall be phased into an NG9-1-1 IP call processing platform that are based on industry accepted standards including NENA 08-003 for TTY migration to SIP/MSRP compliance, as well as NENA 08-002 for web browser migration from hosted platform to in-network platform. |
| **5.2** | **PSAP Text-to-9-1-1 Use Cases** |
| 5.2.1 | **Use Case: Basic Text Message Call from An Interconnected Text Application or SMS.** The solution shall support this use case and shall function as follows:<br>• Person with wireless device using SMS or an Interconnected text application, without speaking to the PSAP, and located within the jurisdictional boundaries of Fairfax County, texts in a request for help and enter the digits '911' as the sender phone number and requests emergency medical assistance. The solution shall complete:<br>o The text call from user to GEM9-1-1 browser accessible by call taker<br>o The location retrieval in the form of lat/lon instance that is provided by the carrier, either coarse or enhanced.<br>o At a minimum, the display of information about the text caller, including:<br>• Callback phone number<br>• Coarse location (coordinates of cell-sector centroid) as received from the carrier<br>• Carrier network delivering text message when available<br>• Horizontal uncertainty information such as latitude, longitude, range in meters of where caller is located<br>• Street map with location of caller indicated by a pinpoint marker<br>The last two bulleted requirements of 5.2.1 are deprecated. |
| 5.2.2 | **Use Case: Basic Text Message Call from An Over the Top (Non-interconnected) Texting Application.** The solution shall support this use case provided that the application has converted the messages to SMS and that the SMS messages are delivered to TCS via SMPP. The solution shall function as follows:<br>• Person with wireless device using SMS or an Over the Top (Non-Interconnected) |

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| | text application, without speaking to the PSAP, and located within the jurisdictional boundaries of Fairfax County, texts in a request for help and enters the digits '911' as the sender phone number and requests emergency medical assistance. The solution shall complete:<br>o The text call from user to GEM9-1-1 browser accessible by call taker<br>o The location retrieval in the form of lat/lon instance that is provided by the carrier, either coarse or enhanced.<br>o At a minimum, the display of information about the text caller, including:<br>• Callback phone number<br>• Coarse location (coordinates of cell-sector centroid) as received from the carrier<br>• Carrier network delivering text message when available<br>• Horizontal uncertainty information such as latitude, longitude, range in meters of where caller is located<br>• Street map with location of caller indicated by a pinpoint marker<br>The last two bulleted requirements of 5.2.2 are deprecated. |
| 5.2.3 | **Use Case: Unknown Text Message Call.** The solution shall support this use case and function as follows:<br>• Person with wireless device using SMS or an Interconnected text application, without speaking to the PSAP, and located within the jurisdictional boundaries of Fairfax County, texts in the word 'Help" and enters the digits '9-1-1' as the sender phone number and the texter does not provide any other response to the PSAP call taker. The solution shall complete:<br>o The text call from user to GEM9-1-1 browser accessible by call taker<br>o The location retrieval in the form of lat/lon instance that is provided by the carrier, either coarse or enhanced.<br>o At a minimum, the display of information about the text caller, including:<br>• Callback phone number<br>• Coarse location (coordinates of cell-sector centroid) as received from the carrier<br>• Carrier network delivering text message when available<br>• Horizontal uncertainty information such as latitude, longitude, range in meters of where caller is located<br>• Street map with location of caller indicated by a pinpoint marker<br>The last two bulleted requirements of 5.2.3 are deprecated. |
| 5.2.4 | **Use Case: Transfer Text Message Call between Text-Enabled PSAPs.** The solution shall support this use case and function as follows:<br>• Person with mobile device, located on the border of the jurisdictional boundary of Fairfax County, without speaking to the PSAP, texts 9-1-1 and requests emergency medical assistance. The solution shall complete:<br>o The text call from user to GEM9-1-1 browser accessible by call taker<br>o The location retrieval in the form of lat/lon instance that is provided by the carrier, either coarse or enhanced.<br>o The transfer of text message call to neighboring PSAP jurisdiction with complete history of initial text call passed to the transferred jurisdiction.<br>o The transfer of the text "call" from the initial PSAP to the 'transferred to' PSAP without need of any voice communications between PSAPs. The act of transferring a text call to another PSAP shall occur via a drop down box to select a PSAP from a list to which the text can be transferred.<br>• The web browser shall be developed to auto-populate the text being transferred with a text supplement message stating something similar to |

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| | 'Fairfax County transferring a text message call to PSAP _____ '( where the blank line would auto populate with the 'transferred to' PSAP name). This feature is targeted for deployment in April 2015.<br>• The web browser shall be developed for the user to color code or mark the transferred in conversation text history from the original PSAP to indicate the communication was conducted by a third party and to differentiate which communications were conducted by their PSAP and which were conducted by another PSAP. This feature is targeted for deployment in April 2015.<br>• The web browser shall be developed to provide to the transferring PSAP a positive confirmation (not via a voice phone call) that the transfer has been received at the 'transferred to' PSAP and that the 'transferred to' PSAP has begun to interact directly with the texter. This confirmation shall indicate that the control of the call was officially transferred and time stamped when such transfer was made. This feature is targeted for deployment in April 2015.<br>• The browser session that requests location updates shall receive location updates during a text conversation within the original PSAP. The original PSAP's browser session(s) shall have the capability to monitor text conversations.<br>• The browser shall be developed to allow the 'transferred to' PSAPs to receive control of text conversations and release the control from the original PSAP. The control shall be within a PSAP across multiple workstations and shall include the ability to anchor transferred texts, manage the text conversations, request for location updates, and monitor text conversations. This feature is targeted for deployment in April 2015.<br>• The browser shall be developed to provide options and capabilities with each option to handle transferring situations when the 'transferred to' PSAP is busy and cannot confirm they have received the text. The options shall include:<br>o The ability of the original transferring PSAP to reclaim control of the conversation in the event that either the 'transferred to' PSAP is unavailable or the number of sessions exceeds the session limit established by the 'transferred to' PSAP. This feature is targeted for deployment in April 2015.<br>o The ability to time-stamp the initiation of the transfer and the subsequent rejection of the transfer in the event that either the 'transferred to' PSAP is unavailable or the number of sessions exceeds the session limit established by the 'transferred to' PSAP. This feature is targeted for deployment in April 2015.<br>• The browser shall archive text history conversations locally for up to one year and be made accessible via administrative rights.<br>• The browser shall be developed to establish a single unique session ID for each text history conversation. The unique session ID shall be passed to the 'transfer to' PSAP. This feature is targeted for deployment in April 2015. |
| 5.2.5 | **Use Case: Transfer Text Message Call between One Text Enabled PSAP and One Non Text Enabled PSAP**. The solution shall support this use case and function as follows:<br>• Person with mobile device, located on the border of the jurisdictional boundary of Fairfax County, without speaking to the PSAP, texts 9-1-1 and requests emergency medical assistance. The solution shall complete:<br>o The text call from user to GEM9-1-1 browser accessible by call taker<br>o The location retrieval in the form of lat/lon instance that is provided by the carrier, either coarse or enhanced. |

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| | o The browser ability for a call taker to determine which PSAPs who are not web browser enabled.<br>o The browser ability to show the transferred session in the "New Sessions" dialogue area to indicate the text conversation the transferring PSAP wishes to transfer.<br>• GEM9-1-1 browser shall provide the ability for call taker to transfer to a PSAP that is configured to accept SMS Text-to-911 sessions from EMedia over TTY. (The 'transferred to' PSAP with TTY does not have the ability to transfer the call back to the original PSAP using GEM9-1-1).<br>• The browser shall be developed to provide confirmations that the call has been transferred to another 'transferred to' PSAP. This feature is targeted for deployment in April 2015.<br>• Transfer of the text "call" from the initial PSAP to the 'transferred to' PSAP shall be accomplished without need of any voice communications between PSAPs. The act of transferring a text call to another PSAP shall occur via a drop down box to select a PSAP from a list to which the text can be transferred.<br>• The web browser solution should auto-populate the text being transferred with a text supplement message stating something similar to 'Fairfax County transferring a text message call to PSAP _____ '( where the blank line would auto populate with the 'transferred to' PSAP name). This feature is targeted for deployment in April 2015. |
| 5.2.6 | **User Case: Turn off Text Message Receipt at PSAP.** The solution shall support this use case and function as follows:<br>• SMS Text-to-911 capability shall be invoked by the call taker logging into the browser. The browser shall allow the PSAP administrator to set the maximum number of active text sessions.<br>• The browser shall provide the ability to temporarily suspend the receipt of SMS Text-to-911. The browser shall invoke a bounce-back message to the texters when the PSAP has logged out of all GEM9-1-1 sessions or the PSAP administrator has set the number of GEM9-1-1 sessions to zero.<br>• TCS shall cooperatively test with each PSAP that invokes the backup processing of text messages and requires the switching from browser to TTY environment in an emergency when the IP network is unavailable but phone circuits are available.<br>• The browser shall be developed to have incoming text messages to an email address as a backup option. This feature is targeted for deployment October 2015.<br>• The browser shall display a warning message when the last user attempts to log out. |
| 5.2.7 | **Use Case: Call Taker Shift Change Over Within Same Operations Center.** The solution shall support this use case and function as follows:<br>• At shift change, the browser shall permit the outgoing operator to log out of the GEM9-1-1. The browser shall support the incoming operator to log into GEM9-1-1 and receive immediate access to "New and Other" session queues from which the operator can select and manage an ongoing session.<br>• In handing over control of the texting conversation from one call taker to another call taker, the browser shall permit the new operator to log into the GEM9-1-1 and continue the text conversations with the caller. |
| 5.2.8 | **Use Case: Language Interpretation Interfaces or Conferencing.**<br>• The solution shall support Spanish language interpretation of incoming text messages on a per minute fee basis. This feature is targeted for deployment in September 2015, subject to third party completion. Language Interpretation sessions may not be subject to transfer. |

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| 5.2.9 | Requirement 5.2.9 is deprecated. |
| **5.3** | **9-1-1 Network Compatibility** |
| 5.3.1 | The solution, including software, hardware and interconnections, shall be compatible with a NENA ESInet 08-003 (i3 specification) or the ATIS JSTD-110 standards where functionality are applicable. |
| 5.3.2 | The browser shall provide access to session histories in their entirety through administrative rights login. This feature is targeted for deployment in April 2015. |
| 5.3.3 | [redacted] |

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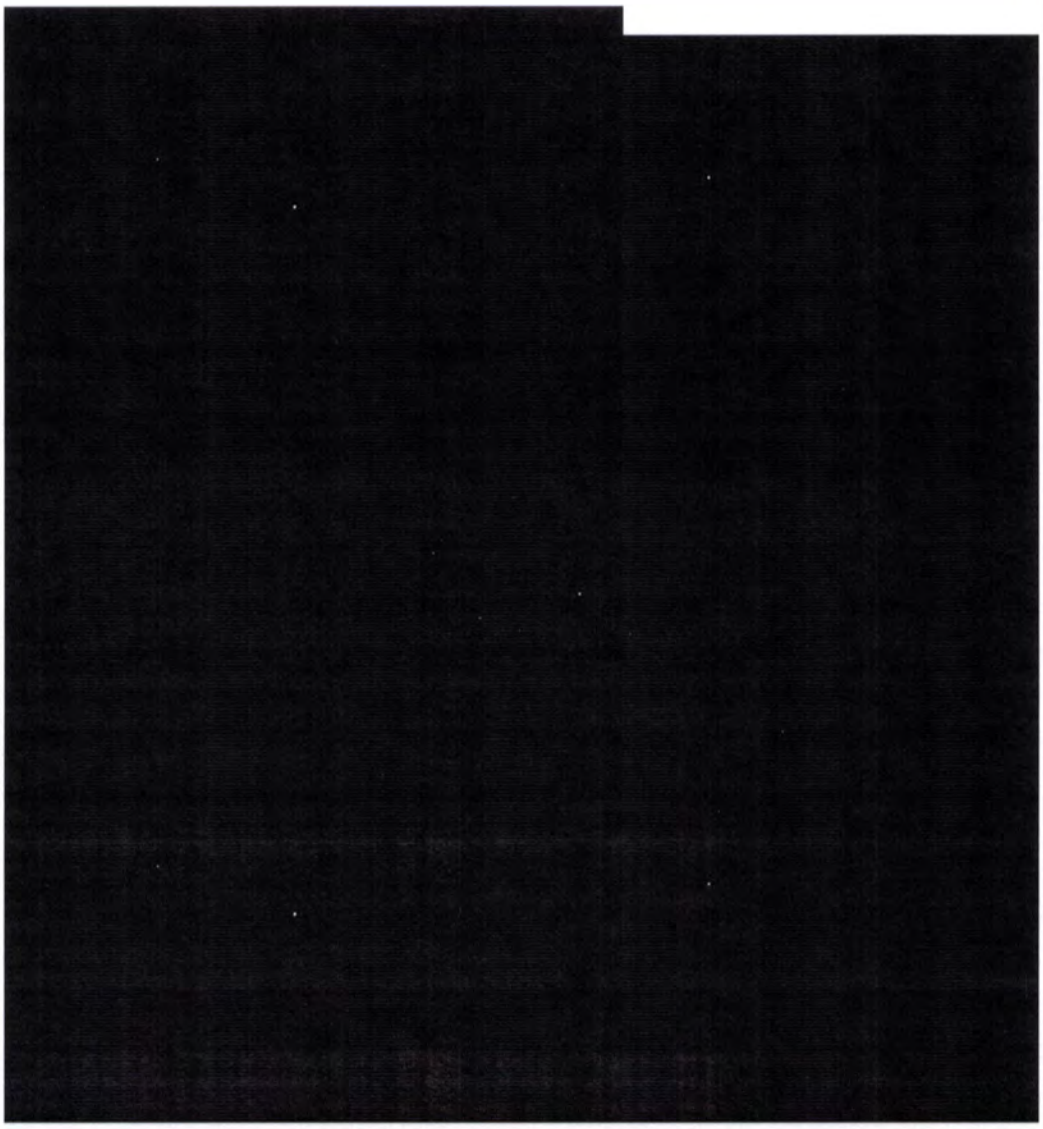
| |  |
| **5.4** | **Recording and Playback** |
| 5.4.1 | The GEM9-1-1 web browser interface includes access to the entire session history through the administrative login. The text dialogue for the sessions can be reviewed through this interface. This includes all messaging between the operator and the texter. In the future, when the language translation interface is available, this text will include both the translated text and the English version.<br><br>Instructions on how to access the session histories will be included in the Administrator Training module. |

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| **5.5** | **TCS Standard Training** |
| 5.5.1 | TCS shall provide the following training services:<br>• Train-The-Trainer sessions via web conference. One web based training session included. Additional training sessions available at professional services rate.<br>• A TCS standard simulator or tutorial CDs accessible to each of the MWCOG PSAPs. |
| 5.5.2 | **Copies of Training Materials Authorized for Reproduction**<br>• Ownership of (and all intellectual property rights in) all materials developed, made available or otherwise provided by TCS to the County shall remain with TCS but the County may use copies of training materials and user manuals in support of the County's authorized use of TCS' Text-to-9-1-1 services, and may reproduce such training materials and/or user manuals for such authorized use, at no additional charge; provided, that all TCS titles, trademarks and copyright and restricted notices included in such materials and/or manuals shall be reproduced in all such copies. |
| 5.5.3 | **User Operations Training**<br>• TCS shall present a plan to provide a 'Train the Trainers' one (1) day (eight (8) hour) comprehensive training webinar oriented to non-technical floor operations personnel who will then train the rest of the County operations staff. The 'Train the Trainers' curriculum shall include:<br>o Logging in<br>o The features of the GEM9-1-1 interface for users<br>o Taking control of a new session<br>o The background information about elements (e.g., where the lat/lon comes from)<br>o How to use the predefined, canned messages<br>o How to free-form type messages<br>o How to use a canned message and edit it before sending<br>o Use of the map for zooming and tracking<br>o PSAP-to-PSAP transfer<br>o Taking over for another operator in the same PSAP<br>o How to get support<br>o Other mutually agreeable topics<br>o Administrative functions<br>o Setting up users<br>o Viewing call history<br>o Setting up and managing predefined messages<br>o Viewing PSAP operator status (online/offline)<br>• The materials for the training shall include a manual or pamphlet that contains the essential desk side guide the trainers can use as a tool to train the rest of the staff. The number of students per training class shall not exceed eight (8) persons. |
| 5.5.4 | **Technical Operations Training**<br>• TCS shall present a plan to provide a one (1) day (eight (8) hour) comprehensive training webinar to train, qualify, and certify as needed the Technical operations staff for DPSC. The number of students per training class shall not exceed five (5) persons. The 'Technical Operations Training' curriculum shall include:<br>o Network requirements<br>o Protocols |

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| | ○ How to access technical support<br>○ The administrative functions of GEM9-1-1<br>○ Tier 2 support |
| | **Customer Support and Reporting Requirements** |
| **5.6** | **Customer Support Services** |
| 5.6.1 | TCS shall monitor all components of the system 24 x 7 to immediately identify potential problems or outages and shall make necessary notifications consistent to the TCS NOC services procedures, response times, and escalation plan as specified in Appendix A. |
| 5.6.2 | Appendix A shall outline the manner in which the County should contact the contractor's Network Operations Center (NOC) and help desk operational procedures for supporting the Text-to-9-1-1 messaging system. |
| 5.6.3 | **Help Desk**<br>TCS shall provide the following customer support services for all services provided under the contract and any renewals thereof:<br>• TCS NOC shall operate a help desk for the purpose of receiving, logging, tracking, dispatching, and reporting on trouble calls. The TCS NOC shall be fully operational and staffed on a 24 x 7 basis. There shall be supervisory staff on-site at the help desk on a 24 x 7 basis.<br>• The TCS NOC, operating as a help desk, shall answer calls by a live staff who are trained and qualified on the systems and services furnished under this RFP. In very rare instances, occasions when the calls are greeted by voice mail systems shall be returned if a message left in the voice mail box.<br>• The TCS NOC shall serve as a single point of contact for PSAPs for all matters, including without limitation, the system and all components of the system. The help desk shall have the ability to communicate directly and immediately with maintenance and support services for the system and all components of the system, including without limitation, network troubles.<br>• The TCS NOC shall have the authority to dispatch maintenance staff from all contractors, manufacturers, subcontractors and other entities responsible for any components or services contracted for through the RFP. TCS shall dispatch staff in a timely manner to meet the response time requirements stated in Appendix A. |
| **5.7** | **Graphical User Interface and Status Windows** |
| 5.7.1 | Requirement 5.7.1 is deprecated. |
| 5.7.2 | The GEM9-1-1 browser shall be compatible with IE versions 8 through 10, Chrome version 34.0, and Firefox 32.0 all of which and support drop-down boxes, check boxes, text boxes, and radio buttons. |
| 5.7.3 | The GEM9-1-1 browser shall present to the text-call-taker, at a minimum, with the status of the following categories:<br>• Unanswered/New Text Events – shows the texter's phone number (ringing)<br>• Active sessions that the current operator is managing by phone number (active calls by operator)<br>• Active sessions being managed by other operators in the same PSAP, also by phone number (other active sessions for the PSAP)<br><br>The GEM9-1-1 administrative browser shall present to the administrator:<br>• Number of active Text-to-9-1-1 call-takers. |
| **5.8** | **Management and Statistical Reporting** |
| 5.8.1 | TCS shall provide management and statistical reporting functionality to PSAP management |

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| | personnel with real-time and historical information through its business partner Direct Technology for the Emergency Call Tracking System (ECaTS). It shall be user friendly, semi-customizable and capable for generating reports for varying time periods. The solution also shall be able to auto-schedule the generation of predefined reports. |
| 5.8.2 | Requirement 5.8.2 is deprecated. |
| | **General Technical Compliance Requirements** |
| **5.9** | **NENA i3 Architecture Compliance** |
| 5.9.1 | The solution shall be forward compatible into the NENA 08-003 i3 standard and i3 call processing platform and environment in the following manner in the future:<br>• The solution's ESRP/PRF and ECRF shall be embedded core components of the system.<br>• The solutions ESRP/PRF and ECRF shall be capable of supporting multimedia<br>• SMS Text-to-9-1-1 events are delivered over HTTP which is also compatible to ATIS JSTD-110 standard.<br>• The flexible capabilities to interoperate with a mix of PSAP i3 CPE interfaces such as to-and-from browser and SIP/MSRP-capable PSAPs. Text over MSRP is a NENA i3 feature.<br>• The ability to transfer between non-TTY PSAPs using different interfaces<br>• The integration path option to incorporate Fairfax' GIS data for routing SMS Text-to-9-1-1 events.<br>• The deployment path option to upgrade PSAPs to NG9-1-1 voice.<br>• The deployment path option to an in-network text-only i3-compliant system in the long range future if desired. |
| 5.9.2 | The solution shall provide the following capabilities that are compatible to NENA 08-003 and ATIS JSTD-110 standard to ensure forward path toward NENA i3-based NG9-1-1 functionality:<br>• The solution shall be deployed as hosted EMedia/GEM9-1-1 services by connecting NCRnet to the TCS MPLS network to achieve reliability/dependability as governed by NENA's technical standards for NG9-1-1 and E9-1-1 as illustrated in requirement 5.3.3.<br>• The future option of deploying the TCS xGEM9-1-1 text-only NG9-1-1 system shall be available.<br>• PSAP by PSAP deployment to align with NG9-1-1 migration schedule is available.<br>• GEM9-1-1 system shall use an MSRP-based connection from the TCS TCC.<br>• GEM9-1-1 system shall function as a terminating or distributing TCC.<br>• The future option of EMedia to be upgradable to interface with other NG9-1-1 solution over MSRP and allow the ESRP to distribute the messages. |
| 5.9.3 | The solution shall be compatible with the following standards by implementing their recommended best practices where applicable:<br>• NENA 8-003 v1 Detailed Functional and Interface Specification for the NENA i3 Solution, Stage 3 Version 1<br>• NENA 8-002 NENA Functional and Interface Standards for Next Generation 9-1-1 Version 1.0 (i3)<br>• NENA 08-751 NENA i3 Technical Requirements Document; relevant components: EMedia<br>• NENA 04-001 Section 10.4 Software Quality<br>• NENA 58-001 NENA IP-Capable PSAP Minimum Operational Requirements Standards<br>• NENA 58-501 IP PSAP 9-1-1 System Features and Capabilities<br>• NENA 75-001 Security for Next Generation 9-1-1 Standard (NG-SEC), |

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| | • NENA 75-001 v1, and NENA 04-503 v1;<br>• NENA 75-502, NENA 04-502 v1, NENA 04-503 v1, NENA 08-506 v1, NENA 08-752 v1, NENA 71-502 v1, NENA STA-003;<br>• Applicable Internet Engineering Task Force Standards (IETF), such as IP protocols, IP routing protocols, SIP, RTP, LoST, and the PIDF-LO;<br>• NENA Emergency Services IP Network Design for NG9-1-1; |
| 5.9.4 | The solution shall comply with NENA 08-003 (i3) and ATIS JSTD-110 standards, and compatible with other NENA standards as specified in requirement 5.9.3. |
| **5.10** | **General Technical Requirements** |
| **5.10.1** | **Solution Availability** |
| 5.10.1.1 | TCS shall utilize the County's provided network circuits in the following manner in order to provide a highly available solution:<br>• **Multiple Network Paths to PSAP with Carrier Diversity**. The County shall provide a minimum of two circuit connectivity, each with a minimum of 3 Mbps to 5 Mpbs of bandwidth, from NCRnet nodes to TCS TCCs. TCS strongly suggests using diverse network providers to achieve high availability.<br>• **Multiple Browser Access to PSAP**. The County shall provide a minimum of two workstations per PSAP.<br>• The system shall be geographically redundant supported by two data centers.<br>• The system shall provide physical redundancy through different network circuit providers.<br>• The system shall be architected as active-active.<br>• The TCC change control for system upgrades shall be pre-approved by the County with back-out plans.<br><br>[redacted] |
| 5.10.1.2 | The solution shall operate on a compatible browser engine provided by the County on an existing CPE screen or new screen. The solution shall be permitted by the County network to use HTTP to each PSAP. The solution shall be permitted by the County network to be connected to NCRnet. The solution shall be permitted by the County network to migrate to SIP/MSRP to each PSAP in the future to support NENA 08-003 (i3) in the future when invoked. |

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| 5.10.2 | Geographic Information System |
| 5.10.2.1 | Requirement 5.10.2.1 is deprecated. |
| 5.10.2.2 | The solution shall utilize Bing as its default national common mapping system interface. The solution shall migrate to Nokia HERE maps, previously known as NAVTEQ without disruption of service. |
| **5.10.3** | **Interoperability** |
| 5.10.3.1 | Requirement 5.10.3.1 is deprecated. |
| 5.10.3.2 | TCS shall perform lab-to-lab interoperability testing specific to MSRP interoperability with Fairfax's procured systems such as Airbus DS, Vesta, Texting applications, Incident Management Systems, Smart911, etc. The tests shall be coordinated and scheduled based a mutually agreeable timeline and available resources. |
| **5.10.4** | **Solution Sizing** |
| 5.10.4.1 | The solution shall be sized to support the MWCOG PSAPs as listed in RFP shown below and shall be expanded reasonably to accommodate text traffic growth. |

**Metropolitan Council of Governments PSAPs Configuration Overview for Text to 9-1-1**

| | Primary PSAPs* | Total CAMA Trunks | Wireline CAMA Trunks | Wireless CAMA Trunks | VOIP CAMA Trunks | 9-1-1 Call Taking Positions | Fire Dispatch (Only) Positions | Police Dispatch (Only) Positions | Supervisor Only Positions |
|---|---|---|---|---|---|---|---|---|---|
| VA | Arlington County | 48 | 16 | 16 | 16 | 26 | 0 | 0 | 2 |
| | Alexandria City | 28 | 12 | 16 | 0 | 23 | 5 | 5 | 2 |
| | Fairfax County - PSTOC (Primary) | 28 | 10 | 14 | 4 | 58 | 12 | 12 | 6 |
| | Metropolitan Washington Airports Authority (MWAA) | | | | | | | | |
| | Loudoun County | 26 | 16 | 10 | 0 | 20 | 5 | 5 | 0 |
| | Prince William County | 20 | 10 | 10 | 0 | 15 | 3 | 4 | 2 |
| | Manassas Park (** see Prince William note) | 4 | 4 | 0 | 0 | 3 | 0 | 3 | 0 |
| | Manassas City (** see Prince William note) | 5 | 5 | 0 | 0 | 5 | 0 | 5 | 0 |
| | Stafford County | 18 | 8 | 10 | 0 | 21 | 0 | 0 | 1 |
| | **Backup/Alternate Sites** | | | | | | | | |
| | **Fairfax County - Pine Ridge (Backup/Alternate)** | 28 | 10 | 14 | 4 | 21 | 5 | 5 | 2 |
| | **Alex City Backup (existing/planned)- (Alex, Arl, MWAA)** | 28 | 10 | 14 | 4 | 20 | 5 | 5 | 2 |
| | Loudoun County | | | | | 12 | | | |
| | Prince William County | | | | | 8 | | | |
| MD | Charles County | 8 | 4 | 4 | 0 | 16 | 0 | 0 | 2 |
| | Frederick County | 24 | 12 | 12 | 0 | 24 | 0 | 0 | 3 |
| | Montgomery County | 39 | 19 | 16 | 4 | 46 | 0 | 0 | 0 |
| | Prince George's County | 36 | 20 | 16 | 0 | 34 | 10 | 19 | 6 |
| | **Backup/Alternate Sites** | | | | | | | | |
| | **Montgomery County (Backup/Alternate)** | 38 | 18 | 18 | 4 | 33 | | | |
| | **Charles County** | 6 | 4 | 2 | 0 | 4 | None | None | None |
| | **Prince George's County** | 36 | 20 | 16 | 0 | 28 | 6 | 13 | 6 |
| DC | District of Columbia (** Uses SS7 not CAMA for trunks) | 192** | 96** | 96** | wireline | 40 | 12 | 19 | 5 |
| | **Backup/Alternate Site - District of Columbia** | | | | | 25 | 8 | 14 | 3 |

* - Primary PSAP is defined as a PSAP to which 9-1-1 calls are routed directly from a 9-1-1 Control Office such as a Selective Router or Tandem.

| | Secondary PSAPs* | Total CAMA Trunks | Wireline CAMA Trunks | Wireless CAMA Trunks | VOIP CAMA Trunks | 9-1-1 Call Taking Positions | Fire Dispatch (Only) Positions | Police Dispatch (Only) Positions | Supervisor Only Positions |
|---|---|---|---|---|---|---|---|---|---|
| VA | **Fairfax County** | | | | | | | | |
| | Fairfax City | 4 | 4 | | | 2 | | 2 | |
| | Town of Herndon | 4 | 4 | | | 2 | | 2 | |
| | Town of Vienna | 4 | 4 | | | 2 | | 2 | |
| | **Arlington County** | | | | | | | | |
| | Falls Church | | | | | | | | |
| MD | **Prince George's County** | | | | | | | | |
| | Greenbelt | | | | | | | | |
| | **Montgomery County** | | | | | | | | |
| | Takoma Park | | | | | 3 | | | |
| | Metro Transit | | | | | 3 | | | |
| | MNCPPC Police - Ten Digit | | | | | 3 | | | |
| | MD State Police (Rockville) - Ten Digit | | | | | 2 | | | |
| DC | n/a | | | | | n/a | | | |

* A secondary PSAP is defined as a PSAP to which 9-1-1 calls are transferred from a primary PSAP.

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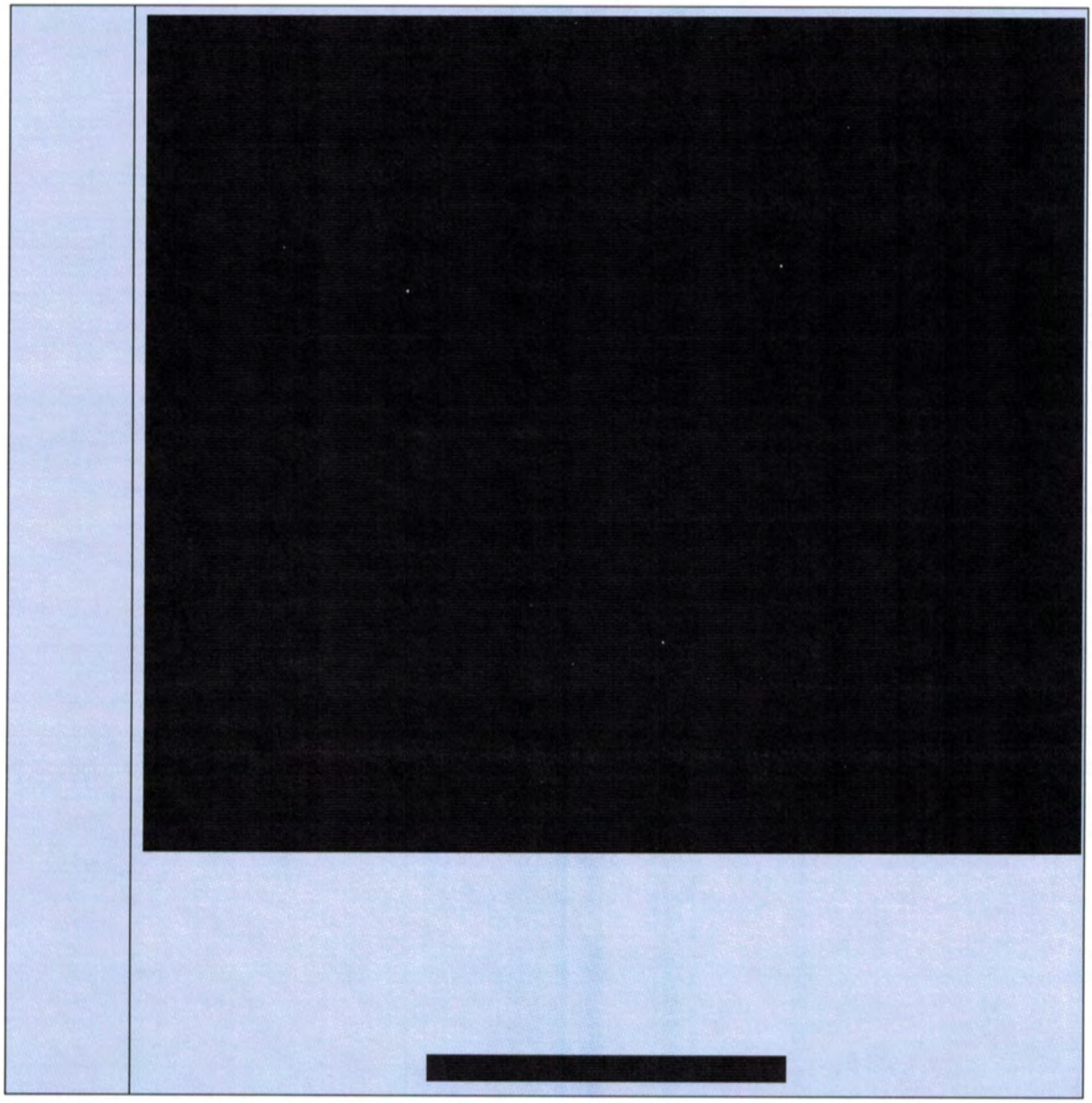
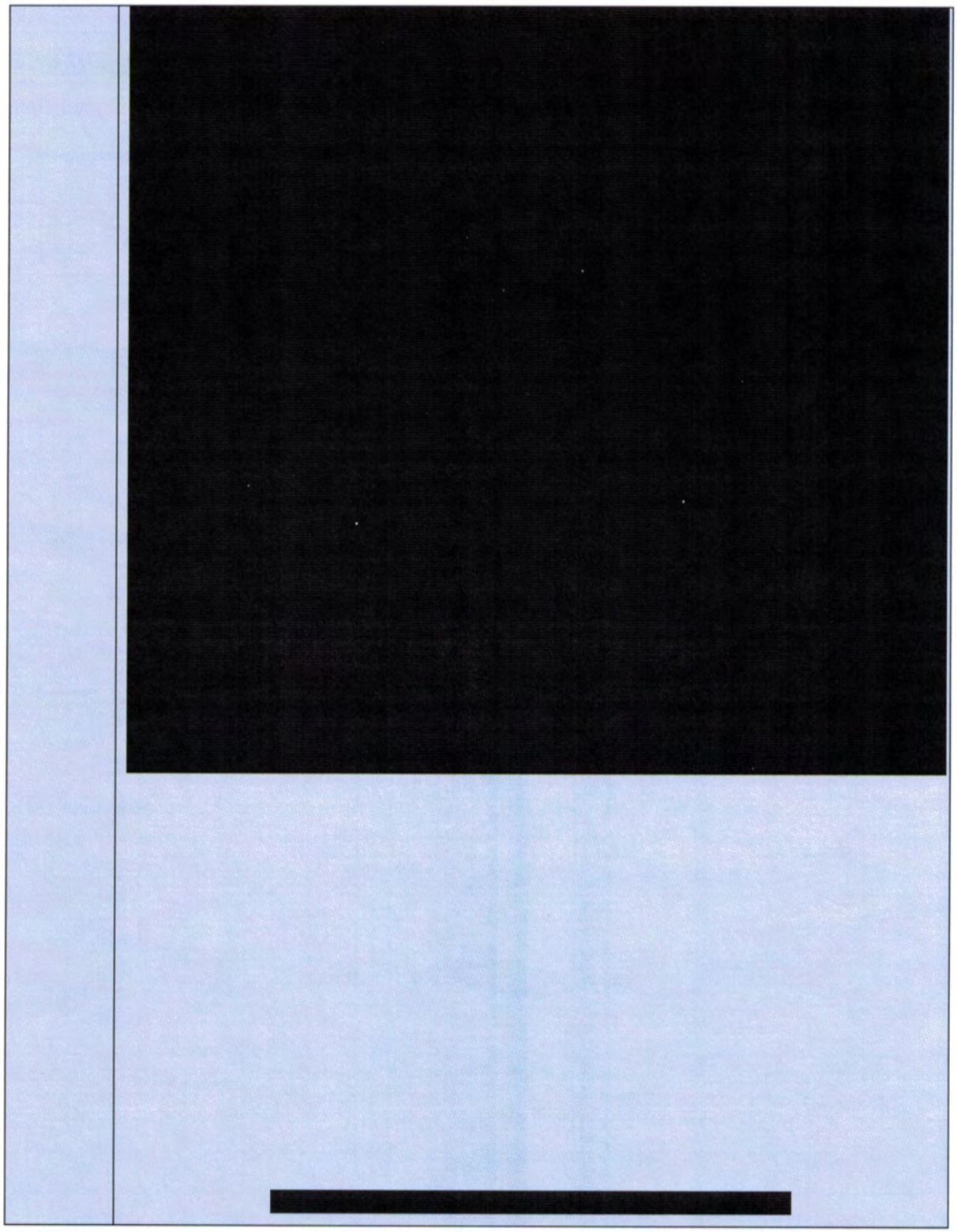
| 5.10.4.2 | TCS' compliance to 5.10.4.1 shall be met by utilizing the Fairfax provided network connections and available bandwidth as follows:<br>• HTTP/HTTPS and/or SIP/MSRP<br>• 3 Mbps to 5 Mbps |
| 5.10.4.3 | The solution shall provide diverse and redundant paths for the receipt of and delivery of text-to-9-1-1 text messages as illustrated in requirement 5.10.1.1. The system shall be geographically and physically redundant as stated in requirement 5.10.1.1. |
| **5.10.5** | **Hosted Solution Capability** |
| 5.10.5.1 | The solution shall be capable of hosting multiple remote PSAPs in multiple jurisdictions with remote positions as listed in the RFP shown in requirement 5.10.4.1 utilizing the Fairfax provided IP transport network known as NCRnet. The solution shall be secured and shall prevent intrusion by unauthorized personnel by employing SBCs at each NCRnet ingress point. |
| 5.10.5.2 | The connection between the host and remote PSAPs shall be IP end-to-end for the GEM9-1-1 browser and SIP/MSRP interface s. For the TTY interface, the solution shall perform signal conversion from host to TTY terminal windows where PSAP require TTY display. The solution shall provide the capability for PSAP administrative rights to retrieve call detail records (CDR) with date/time range queries, to download the report, and print text conversations. |
| 5.10.5.3 | The solution shall support the following three text-to-9-1-1 call flows and interfaces.<br>[redacted] |





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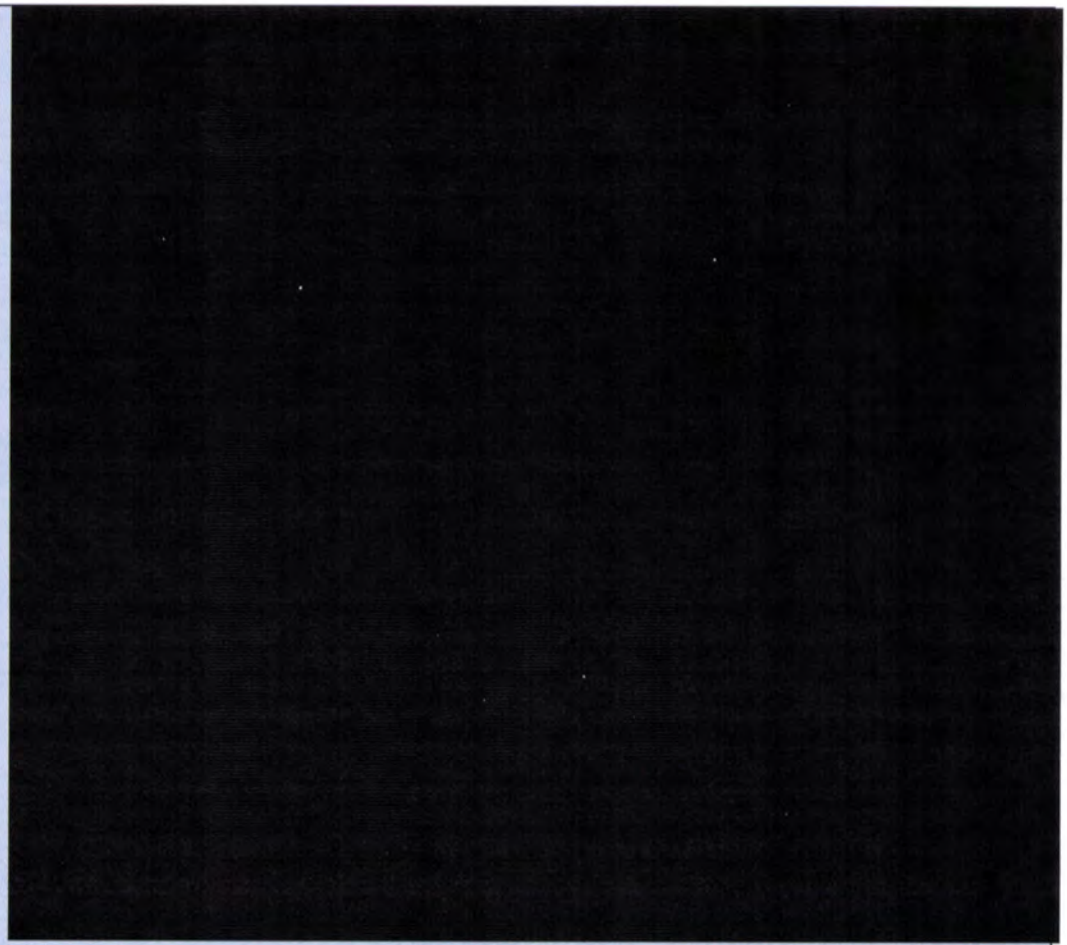
| |  |
| **5.10.6** | **Security** |
| 5.10.6.1 | The solution shall allow for varying levels of administration and security for reconfiguration, monitoring, diagnostic and maintenance activities. Although different jurisdictions may share a common hosted platform, from a PSAP perspective it shall appear to be a dedicated system. Individual PSAPs/jurisdictions shall not have visibility into the activities of other PSAPs/jurisdictions. |
| 5.10.6.2 | The solution shall ensure security and data integrity of individual PSAPs through user authentication by verifying valid logins and passwords upon browser access. Authorized users shall have access to the browser as either a call taker, who shall receive standard call-taker permissions, or an administrator, who shall receive standard call-taker permissions and additional administrative permissions. |
| 5.10.6.3 | **Remote Access and Network Security and Firewalls**<br>TCS shall conform to the Fairfax requirements as follows.<br>All network interfaces connected shall be in accordance with Fairfax County security requirements. TCS shall specify the firewall solution within its network that provides security and protection to the system. TCS shall include a firewall provided for each PSAP connection. All such interfaces connected shall be in accordance with Fairfax County or other mandated security requirements.<br>a. Remote access to County systems or networks shall not be required as part of the |

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| | integration effort.<br>j. TCS users shall agree to Fairfax monitoring when using the service.<br>k. Whenever a computer network connection is established between a County computer and another computer at a location outside an official Fairfax County office, and whenever this connection transmits, or is likely to transmit sensitive information, the link shall be encrypted.<br>**Sensitive and Confidential Information**<br>Sensitive or Confidential information shall not be removed from Fairfax County Government premises unless the information's owner has approved such removal in advance. This includes, but is not limited to, portable computer hard disks, portable memory / media devices and paper documents containing sensitive or confidential information. This paragraph does not apply to authorized off-site backups which are in encrypted form. Hosted solutions are expected to protect sensitive and confidential information in accordance with applicable laws and County policies and standards.<br>**Authorized Tools and Programs**<br>Except as otherwise expressly authorized by DIT/ISO, contractor shall not download, install or run security programs or utilities that reveal weaknesses in the security of a system such as password cracking programs, network reconnaissance/discovery software/applications, key loggers, packet sniffers, network mapping tools, port scanners or any other non-approved programs while connected in any manner to the Fairfax County network infrastructure. |
| **5.10.7** | **Documentation** |
| 5.10.7.1 | Preceding installation, TCS shall deliver two complete sets of as-built drawings, depicting the solution as implemented for the PSAP allowing the PSAP to understand connectivity, at a high level, between the system components and network components that connect the TCS solution to equipment and networks resident at the PSAP. As-built drawings shall be submitted in Microsoft Word format, or other agreed upon graphic format, on two individual sets of CD's. |
| 5.10.7.2 | TCS shall provide documentation for installation, operating and maintenance for each component of the solution that resides in the PSAP environment. This documentation shall include user manuals, maintenance manuals, configuration manuals, parts list of the equipment necessary for the continued and proper preventative maintenance and repair. Manuals shall be in both printed and electronic form (DVD or similar media). Six sets of manuals shall be in printed form. |
| 5.10.7.3 | TCS shall present a detailed project plan outlining tasks, milestones, deliverables, and required resources with a timeline depicting the approach for this solution effort. |
| **5.10.8** | **Optimal Network Connectivity and Bandwidth** |
| 5.10.8.1 | Optimal Network Connectivity and Bandwidth<br>TCS shall recommend optimal network connectivity and bandwidth for Fairfax to implement as follows:<br>For network connectivity, Fairfax is recommended to deploy MPLS connectivity using two diverse MPLS providers and two diverse Local Exchange Carriers (LECs) for carrier redundancy. If carrier diversity is not possible, the recommended alternative approach is for Fairfax to deploy one MPLS provider and grow to two providers as the remainder of MWCOG joins the system. For bandwidth at implementation, Fairfax is recommended to start with 3 Mbps to 5 Mbps of bandwidth per workstation. Once the traffic consists of HTTP to browser-based PSAPs and SIP/MSRP to capable PSAPs, TCS shall recommend higher bandwidth to Fairfax. |
| **5.10.9** | **Wireless Compatibility** |

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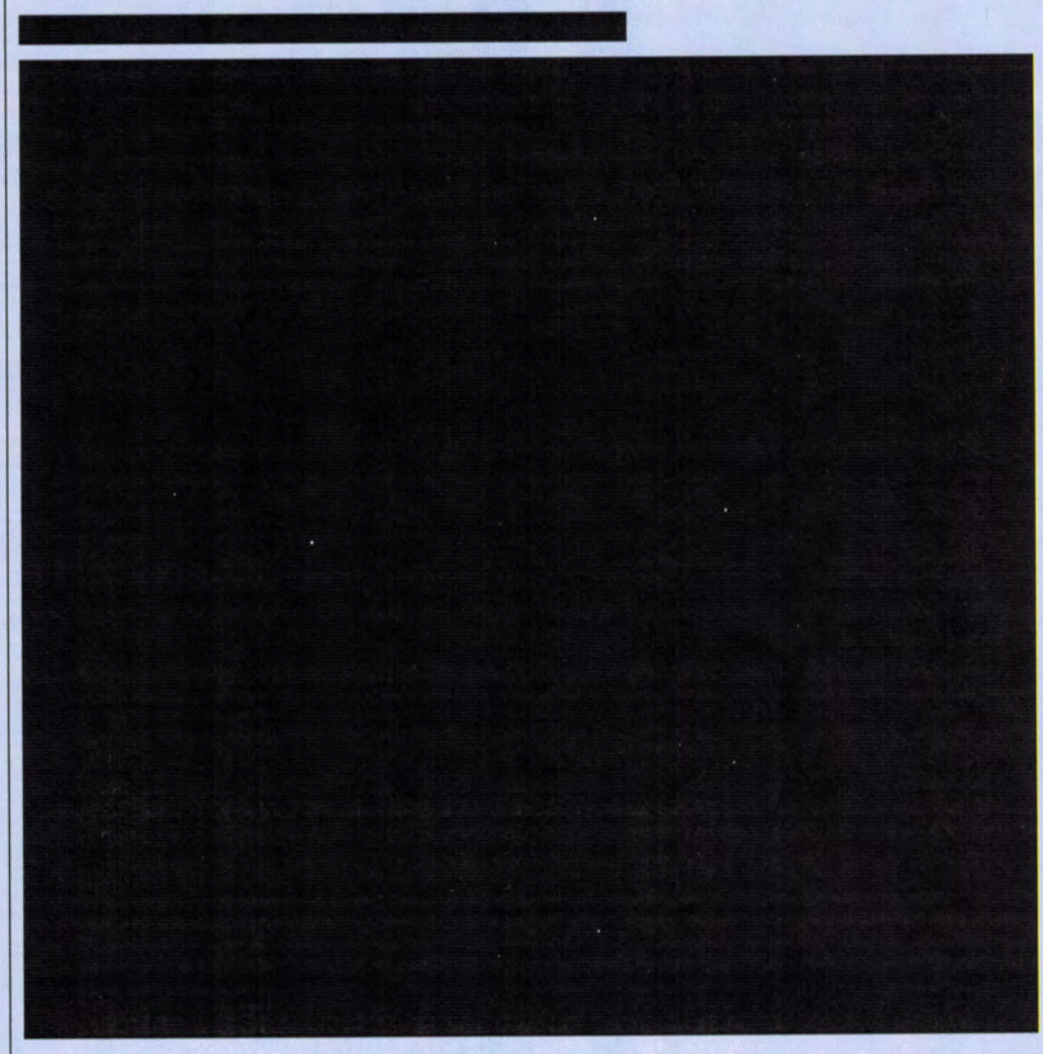
| 5.10.9.1 | The solution's location shall support text originations from the carrier's network generated by commercial location servers (Mobile Positioning Centers [MPCs], GPS, or Gateway Mobile Location Centers [GMLCs]) and the solution shall be compatible to Wireless Phase I and Wireless Phase II. |
| **5.10.10** | **Fault Tolerant** |
| 5.10.10.1 | The solution shall not contain a single point of failure by providing redundant network, system, and software within each component illustrated in the following solution architecture.<br>  <br>Fault-tolerant network configuration shall include:<br>• Redundant data centers<br>• Redundant MPLS providers, if provided by Fairfax<br>• Redundant LECs/diverse LECs per MPLS provider, if provided by Fairfax<br>• Redundant firewalls<br>• Redundant SBCs, where applicable |

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| | • Redundant power source for every network component<br>• Standard battery/generator backup<br>Fault-tolerant system shall include<br>• Geo-redundant TCCs within the TCS data centers<br>• Geo-redundant EMedia systems<br>• Geo-redundant ECRFs<br>• Geo-redundant load balancers<br>• Geo-redundant SBCs<br>Fault-tolerant software shall include<br>• Active-active (not hot/standby) software configuration<br>• Agent/broker messaging architecture |
| **5.10.11** | **Protocols** |
| 5.10.11.1 | The solution shall use Transmission Control Protocol/Internet Protocol (TCP/IP) network connectivity and Hypertext Transfer Protocol Secure (HTTP or HTTPs) web server network design. |
| **5.10.12** | **External Clock** |
| 5.10.12.1 | The solution, including its internal clock, shall be hosted. |
| **5.11** | **County Information Systems Requirements** |
| 5.11.2 | **Applications Platforms and Architecture**<br>The solution shall be a thin client solution using industry accepted web development tools. |
| 5.11.3 | **Database Systems**<br>**The solution, including its database, shall be hosted.** |
| 5.11.4 | **Analytics and Reporting**<br>The solution shall provide the ability to download conversation history in a standard report in CSV format.<br>Report formats outside of CSV format of requirement 5.11.4 are deprecated. |
| 5.11.5 | **Deviations**<br>The system shall have elements that comply with the ATIS JSTD-110 national SMS text-to-9-1-1 standard and/or NENA 08-003 (i3) standard. The browser interface shall comply with ATIS JSTD-110 standard. |
| 6.2 | **Preliminary Work Plan**<br>TCS shall follow the enclosed project plan as the preliminary work plan. The filename is PreliminaryWorkPlan_.pdf. |
| 6.5 | **Project Management**<br>TCS shall assign a project manager to work this project throughout its duration, and TCS shall provide notification prior to making a change in the individual who is assigned to this project. |
| 7.0 | **Consultation Services**<br>TCS staff shall be available throughout the project implementation with County staff from 8 a.m. to 5 p.m. Eastern time, Monday through Friday. If, during the course of the project, there is a specific need for staff to be available outside of this time frame, the project manager will coordinate support staff to be available during other times. After deployment, the TCS NOC staff shall be accessible 24x7 on an as-needed basis. Refer to Appendix A |

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| | TCS NOC Services. |

# 10.0 Project Authorization to Proceed

Based on the scope of work, responsibilities presented herein and pricing set forth in the Agreement, Fairfax will authorize TCS to proceed with the work described in this SOW upon issuance of a mutually acceptable form of purchase order referring to and incorporating the Agreement.

# Appendix A. TCS NOC Services

Appendix A provides information on the TCS NOC Services and Service Impact Level (SIL) support.

## A.1. Service Impact Level (SIL)

TCS provides 99.999% availability for the call routing function within the system. Upon identification of a service-affecting issue, Fairfax shall contact the TCS Network Operations Center (NOC) to open a trouble ticket. The TCS NOC can be reached by calling 1-800-959-3749 or by sending an email to noc@telecomsys.com. Upon receiving customer notification of an issue, the NOC will open an incident ticket, work the issue, escalating appropriately to ensure timely resolution. The NOC will review all tickets on the day they are received. The NOC sends out impairment notifications, impairment updates, and notifications of resolution to all impacted parties.

TCS defines three Service Impact Levels (SILs), as shown in Table A.1. The SIL determines the responsibilities of the TCS NOC when responding to an impairment of service within the systems or the service parameters. The categorization of an event as SIL 1, SIL 2 or SIL 3 shall be reasonably made by TCS, based upon the SIL definitions.

For all SIL 1 events, TCS notifies Fairfax NOC by a voice call. All communication to Fairfax by TCS includes the TCS trouble ticket number.

For SIL 2 and SIL 3, the notification, escalation and resolution guidelines/expectation procedures shall be followed as described in the NOC to NOC Standard Operation Procedure – SOP document.

***Table A.1 SIL Definitions***

| SIL 1 | SIL 2 | SIL 3 |
|---|---|---|
| High level of impact on service delivery.<br><br>Service degradation may be apparent to all or most external stakeholders.<br><br>May involve a trend of SIL 2 events for a given system or process. | Service is suffering an unacceptable level of degradation but is not completely unavailable.<br><br>Service degradation is apparent to external stakeholders.<br><br>May involve a trend of SIL 3 events for a given system or process. | Low level of impact on service delivery.<br><br>Service degradation may be apparent to some external stakeholders (e.g., one PSAP). |

TCS will ensure the response is provided by an appropriately qualified technician.

SIL 1 or SIL 2 events shall be communicated as described in table A.2, based on the best information available at the time.

***Table A.2 Incident Notification Time Frames***

| SIL 1 | SIL 2 | SIL-3 |
|---|---|---|
| Notification occurs as soon as possible but no longer than 1 hour after incident identification.<br><br>Subsequent updates occur hourly. | Initial notification occurs as soon as possible but no longer than 2 hours after incident identification.<br><br>Subsequent updates occur hourly. | No notification. |

For each SIL, TCS has a target resolution time, shown in Table A.3. Typically, incidents are resolved within the target time.

***Table A.3 Target Incident Resolution Times***

| SIL 1 | SIL 2 | SIL 3 |
|---|---|---|
| 2 hours | 4 hours | No more than 7 days |

## A.2. Escalation Contacts

[redacted]

***Table A.4*** [redacted]

| [redacted] | [redacted] | [redacted] |
|---|---|---|
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |

| [redacted] | [redacted] | [redacted] |
| --- | --- | --- |
| [redacted] | [redacted] | [redacted] |